

EPS

“Reg. U.S. Pat. & Tm. Off.”

***“ESCO Approach to Industrial
Energy Efficiency Projects
In International Markets”***

Thomas K. Dreessen

**International Workshop on Energy
Efficiency Services Industries**

Shanghai, China

September 08, 2003

EPS

“Reg. U.S. Pat. & Tm. Off.”

International ESCO Model Used

- **Joint Venture Company between:**
 - **Local Company** that provides market credibility and access to current customer distribution.
 - **US ESCO** with experience in industrial markets that provides key engineering, commercial, legal, financing and risk management training of local staff for key functions. Also provides access to new “proven” technologies
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

Signed Industrial Contracts

- **Glass**
 - **Textile Processing**
 - **Textile Spinning & Weavings**
 - **Pulp & Paper**
 - **Food & Beverage**
 - **High Tech Buildings**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

Technologies Implemented

- **Furnace Combustion and Burner Upgrades**
 - **Compressed Air Upgrade**
 - **Material pre-heating**
 - **Fan control**
 - **Water recycling**
 - **Chemical recovery (caustic soda)**
 - **Effluent heat recovery**
 - **Power Generation**
 - **Paper machine Upgrades**
 - **Pumping Upgrades**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

Key Project Management Aspects

- **Measured Baseline for each Project**
 - **Extensive interaction with Client Operators**
 - **Critical reviews with Client Executive Mgt.**
 - **Formal approval process**
 - **Clearly defined M&V Protocol**
 - **Implementation Details**
 - **Financial Plan**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

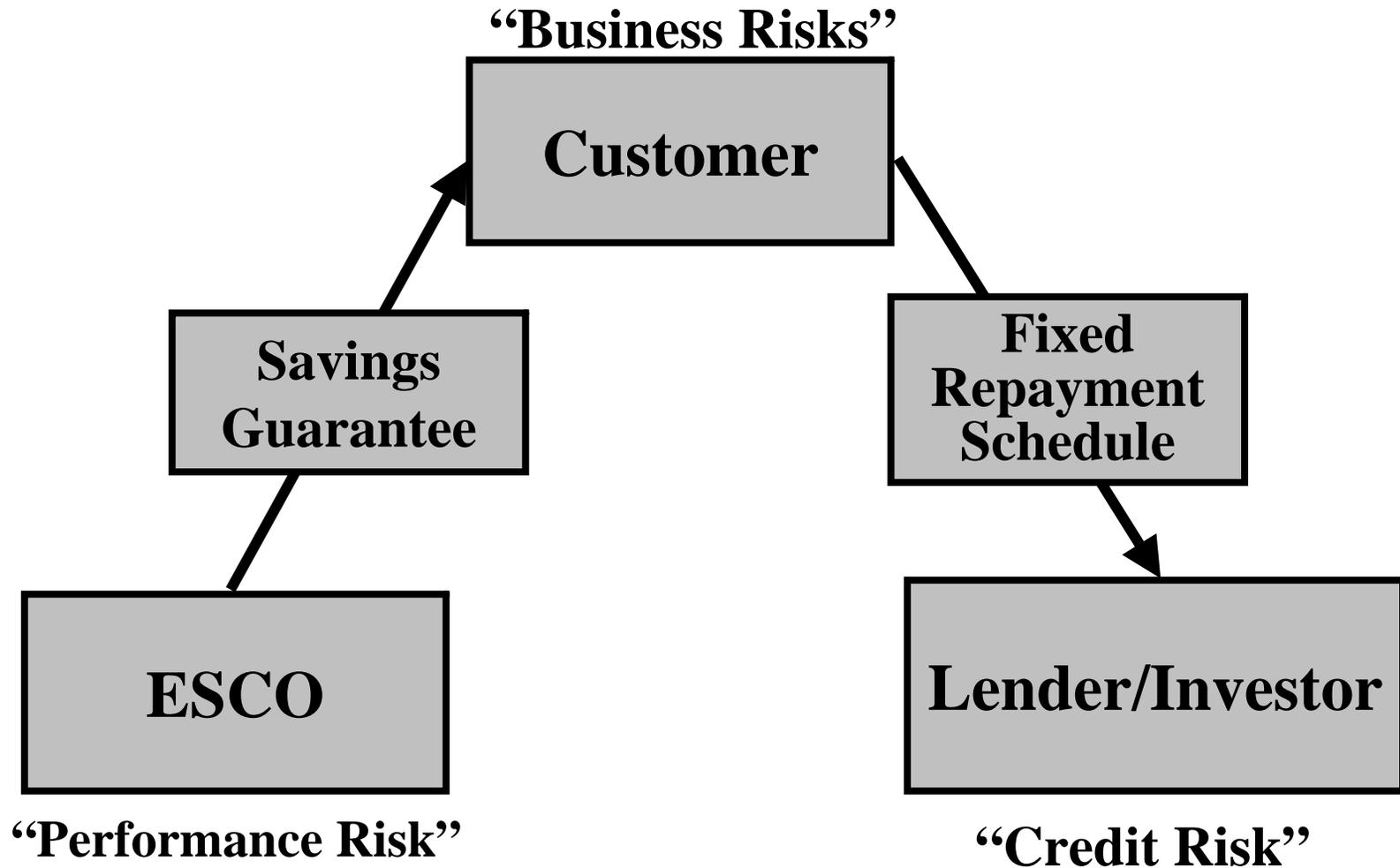
Case Study – India Textile Mill

Seven (7) separate EEPs:

- **Total Project Price** US \$ **5,000,000**
 - **Total Annual Savings** US \$ **1,700,000**
 - **Annual Debt Service** US \$ **1,100,000**
 - **Net Annual Cash Flow** US \$ **600,000**
-

Financing Structure Used

“Guaranteed Savings”



EPS

“Reg. U.S. Pat. & Tm. Off.”

Existing Energy Systems

- **2 Coal-fired Steam Boilers (30/35 Tonnes/hr)**
 - **Steam Uses:**
 - **Manufacturing process heating**
 - **On-site electric power generation**
 - **2/3 of plant's kWh is self-generated**
 - **1/3 of plant's kWh purchased from utility**
-

EPS

"Reg. U.S. Pat. & Tm. Off."

Existing Fuel Consumption

TYPE OF FUEL	<u>COAL</u> (Tonnes/yr)	<u>ELECTRICITY</u> kWh/yr
Self-Generated kWh	68,073	39,400,000
kWh from Utility	-	19,350,000
TOTAL per Year	68,073	58,750,000

EPS

“Reg. U.S. Pat. & Tm. Off.”

Summary of EEPs

<u>MEASURES:</u>	Price	Savings	Simple
	<u>U.S.</u>	<u>U.S.</u>	<u>Payback</u>
#1 Pocket Ventilation Pre-Heat	\$ 100,000	\$ 45,000	2.2
#2 Vacuum Pumps Power Reduction	696,000	253,000	2.8
#3 Refining Power Reduction	882,000	267,000	3.3
#4 WW Aeration Power Reduction	110,000	33,000	3.3
#5 Pumping Power Reduction	196,000	65,000	3.0
#6 Paper Machine Steam/Condensate	696,000	312,000	2.2
#7 On-site Generation Upgrade	<u>2,320,000</u>	<u>790,000</u>	<u>2.9</u>
Total	\$ 5,000,000	\$ 1,765,000	2.8 Yrs.

EPS

“Reg. U.S. Pat. & Tm. Off.”

#4 Wastewater Aeration Power Reduction

- **12 surface aerators used to treat wastewater**
 - **Replace all 12 with new diffused aeration technology to improve oxygen absorption**
 - **Savings from reduced Electricity**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

#6 Paper Machine Steam/Condensate Optimization

- **Upgrade three main energy intensive systems that remove water from the pulp**
 - 1) **Press Section**
 - 2) **Steam Dryers**
 - 3) **Hoods**
 - **Savings from reduced Steam**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

#7 On-site Power Generation & Distribution Upgrade

- **Current System inefficient due to:**
 - 1) Poor Combustion Control on Boilers**
 - 2) Poor steam to power ratio on 1 Turbine**
 - 3) Limitations of electrical distribution system**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

#7 On-site Power Generation & Distribution Upgrade

- **Reduce Self Generation Inefficiencies by:**
 - 1) **Install New Combustion Control on Boilers**
 - 2) **Replace inefficient condensing Turbine**
 - 3) **Upgrade electrical distribution system to permit flexible load management**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

M & V Protocols Used

- **Use of newly-installed meters & instruments**
 - **Each EEP has specific measurements against the Baseline**
 - **Steam-savings - direct meter to measure BTUs**
 - **Electric-savings direct meter to measure kWhs**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

Environmental Benefits Achieved

- **Reduce 31,217 Metric Tonnes (MT) of CO₂ per year or 312,170 MT over the estimated ten-years of the Project for a very low cost of approximately \$0.313 per MT of CO₂ equivalent.**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

Project Benefits Achieved

- **Provides Positive Cash Flow to Owner**
 - **Financed out of Existing Operating Expenses**
 - **Owner receives newest “Proven” Technologies**
 - **Reduces Greenhouse Gas Emissions**
 - **Reduces Work Stoppages - Reliable Power**
 - **Improves Product Quality**
 - **Provides Additional Production Capacity**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

Customer Benefits Received

- **Increase Company's Competitiveness**
 - **Improved Profitability & Cash Flow**
 - **More Production Capacity**
 - **Deemed an Environmental “Player”**
 - **Ability to Pursue New Markets**
 - **Introduction to New Financial Sources**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

International ESCO Lessons Learned: Determine Marketing Strategy

- **By Technology (Boilers/Controls)**
 - **By Sales Approach (Existing Distribution)**
 - **Vertical Market (Only Steel or Hospitals)**
 - **Utility Provider (District Heating/Cooling)**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

International ESCO Lessons Learned: Determine Market Focus

- **Industrial: Industry Specific - Sales calls**
 - **Institutional: General Mktg. - RFP responses**
 - **Commercial: General Mktg. - Sales calls**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

International ESCO Lessons Learned: Develop Technical Core Competency

CUSTOMER

Institutional

Commercial

Industrial

TECHNOLOGY

Building Services

Building Services

Process Services



EPS

“Reg. U.S. Pat. & Tm. Off.”

Building Services

Focus on technologies that improve energy utilization of building needs:

- Lighting & Motors**
 - Heating, Ventilation Air Conditioning**
 - Controls**
 - Boilers (heating)**
 - Chillers (cooling)**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

Industrial Process Services

- **Requires Specialized Expertise with focus on technologies that improve per-unit energy costs**
 - **Furnace upgrades (steel)**
 - **Fans & Motors**
 - **Production controls**
 - **Cogeneration**
 - **Production equipment upgrades**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

International ESCO Lessons Learned: Required Industrial Resources

- **Relationship Sales Process**
 - **Experienced Industrial “Deal Making”**
 - **Sophisticated Contract & Legal Negotiations**
 - **Project Finance Structure is Key**
 - **Cost Tracking is Critical to Profitability**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”

International ESCO Lessons Learned: Required Industrial Resources

- **Industry-Specific Engineering**
 - **Industry-Specific Project Management**
 - **Technology-based Measurement & Verification**
 - **Industry-Specific Operating Knowledge**
 - **Technology Training**
-

EPS

“Reg. U.S. Pat. & Tm. Off.”



“Lessons Learned” SUMMARY

- ◆ *Quality of people is the key to success*
 - ◆ *Partnerships have to be managed*
 - ◆ *Controlling Project Development ‘Time’*
 - ◆ *Corrective Action & Decision Making “Fast”*
 - ◆ *Market demands specialization*
 - ◆ *Market forces favorable to ESCO service*
-